Claim ~~49~~ 48: The method of claim 1, wherein the nucleobase is selected from the group consisting of thymine, uracil, adenine, guanine, hypoxanthinine and analogs thereof.

Claim ~~50~~ 49: The method of claim 49, wherein said analog is selected from the group consisting of: 2-thio-uracil, 6-aza-uracil, 5-carboxy-2-thio-uracil, 6-aza-thymine, 6-aza-2-thio-thymine and 2,6-diamino-purine.

Claim ~~51~~ 50: The method of claim 47, comprising removing said inorganic phosphate by: (i) converting said inorganic phosphate to inorganic pyrophosphate, (ii) precipitating said inorganic phosphate, (iii) complexing said inorganic phosphate or (iv) substrate phosphorylating said inorganic phosphate with a substrate.

Claim ~~52~~ 51: The method of claim 51, comprising reacting said inorganic phosphate with fructose-diphosphate (FDP) to form pyrophosphate and fructose-6-phosphate (F6P).

Claim ~~53~~ 52: The method of claim 52, wherein the reaction is catalyzed by a Ppi-dependent phosphofructokinase (PFK-Ppi, EC 2.7.1.90).

B1 Claim ~~54~~ 53: The method of claim 51, comprising removing the inorganic pyrophosphate by precipitation.

Claim ~~55~~ 54: The method of claim 51, comprising reacting said inorganic phosphate with a saccharide to form a monosaccharide and a phosphorylated monosaccharide.

Claim ~~56~~ 55: The method of claim 55, wherein the saccharide is a disaccharide.

Claim ~~57~~ 56: The method of claim 56, wherein the disaccharide is sucrose or maltose.

Claim ~~58~~ 57: The method of claim 55, wherein the phosphate transfer is catalyzed by a sucrose phosphorylase (EC 2.4.1.7) or a maltose phosphorylase (EC 2.4.1.8).

Claim ~~59~~ 58: The method of claim 55, further comprising reacting the phosphorylated monosaccharide to form a galactoside.

Claim ~~60~~ 59: The method of claim 1, further comprising generating deoxyribose-1-phosphate by isomerizing deoxyribose 5-phosphate (dR5P) prior to reacting said deoxyribose-1-phosphate with a nucleobase.

Claim 60 (~~61~~): The method of claim 60, comprising isomerizing said deoxyribose 5-phosphate with a deoxyribomutase (EC 2.7.5.1) or a phosphopentose mutase (PPM, EC 5.4.2.7).

Claim 61 (~~62~~): The method of claim 60, further comprising forming the deoxyribose-5-phosphate by condensing glyceraldehyde 3-phosphate (GAP) with acetaldehyde prior to isomerization.

Claim 62 (~~63~~): The method of claim 62, comprising catalyzing said condensation with a phosphopentose aldolase (PPA, EC 4.1.2.4).

Claim 63 (~~64~~): The method of claim 62, further comprising enzymatically generating said glyceraldehyde 3-phosphate (GAP) from fructose 1,6-diphosphate, dihydroxyacetone (DHA) or glycerolphosphate prior to condensation.

Claim 64 (~~65~~): The method of claim 64, comprising generating the glyceraldehyde 3-phosphate from fructose 1,6-diphosphate in a reaction catalyzed by an FDP-aldolase I or an FDP-aldolase II.

Claim 65 (~~66~~): The method of claim 64, comprising generating the glyceraldehyde 3-phosphate by reacting dihydroxyacetone and ATP to form dihydroxyacetone phosphate (DHAP) and ADP and subsequently isomerizing DHAP to GAP in a reaction catalyzed by glycerokinase (GK, EC 2.7.1.30) and a triose phosphate isomerase (TIM, EC 5.3.1.1).

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Claim 66 (~~67~~): The method of claim 64, comprising generating the glyceraldehyde 3-phosphate by reacting glycerol phosphate (GP) and O_2 to form dihydroxyacetone phosphate (DHAP) and H_2O_2 and subsequently isomerizing DHAP to GAP in a reaction catalyzed by a glycerophosphate oxidase (GPO, EC 1.1.3.21) and a triose phosphate isomerase (TIM, EC 5.3.1.1).

Claim 67 (~~68~~): The method of claim 60, further comprising generating said deoxyribose 5-phosphate by phosphorylating deoxyribose prior to isomerization.

Claim 68 (~~69~~): The method of claim 68, wherein the phosphorylation of deoxyribose is catalyzed by a deoxyribokinase (dRK, EC 2.7.1.15).

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Claim ~~70~~. The method of claim 69, wherein said dRK is obtained from Salmonella typhi and is encoded by (a) the nucleotide sequence of SEQ ID NO: 11, (b) a nucleotide sequence encoding the protein encoded by SEQ ID NO: 11 or (c) a nucleotide sequence hybridizing under stringent conditions to the complementary sequence of (a) or (b).

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Claim ~~71~~. The method of claim 1, further comprising reacting a deoxyribonucleoside containing a first nucleobase with a second nucleobase to form a deoxyribonucleoside containing the second nucleobase.

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Claim ~~72~~. The method of claim 71, wherein said second nucleobase is selected from cytosine and cytosine analogs.

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Claim ~~73~~. The method of claim 71, wherein said second nucleobase is selected from the group consisting of 5-aza-cytosine, 2,6-dichloro-purine, 6-aza-thymine and 5-fluoro-uracil.

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Claim ~~74~~. The method of claim 71, wherein the reaction is catalyzed by a nucleoside 2-deoxyribosyl transferase (NdT, EC 2.4.2.6).

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Claim ~~75~~. The method of claim 74, wherein said NdT is obtained from Lactobacillus leichmannii and is encoded by (a) the nucleotide sequence of SEQ ID NO: 13, (b) a nucleotide sequence encoding the protein encoded by SEQ ID NO: 11 or (c) a nucleotide sequence hybridizing under stringent conditions to the complementary sequence of (a) or (b).

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Claim ~~76~~. The method of claim 27, wherein the reaction is carried out without isolating intermediate products.

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Claim ~~77~~. The method of claim 27, wherein the glyceraldehyde 3-phosphate (GAP) is generated from fructose 1,6-diphosphate (FDP), dihydroxy-acetone (DHA) or glycerolphosphate (GP) prior to condensation.

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Claim ~~78~~: The method of claim 27, further comprising removing excess acetaldehyde before step (ii).

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Claim ~~79~~. The method of claim 27, further comprising removing excess starting materials or by-products before step (ii).

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Claim ~~80~~. The method of claim 79, wherein said excess starting materials or by-products are selected from the group consisting of fructose 1,6-diphosphate and deoxyxyulose 1-phosphate (dX1P).

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Claim ~~81~~: The method of claim 27, wherein no substantial amounts of starting materials or by-products are present before step (ii).

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Claim ~~82~~. The method of claim 81, wherein said excess starting materials or by-products are selected from the group consisting of fructose 1,6-diphosphate and deoxyxyulose 1-phosphate.

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Claim ~~83~~. The method of claim 33, wherein the reaction is carried out without isolating intermediate products.

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Claim ~~84~~. The method of claim 27, further comprising removing the inorganic phosphate in step (iii).

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Claim ~~85~~. The method of claim 33, further comprising removing the inorganic phosphate in step (iii).

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Claim ~~86~~. The method of claim 1, comprising further reacting said deoxyribonucleoside to synthesize deoxyribonucleoside mono-, di- or triphosphates, of H-phosphonates or phosphoramidites.

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Claim ~~87~~. A method for preparing an enzyme for an <u>in vitro</u> method for the enzymatic synthesis of a deoxyribonucleoside, comprising reacting (i) an isolated nucleic acid molecule encoding a nucleoside 2-deoxyribosyl transferase (NdT, EC 2.4.2.6) with (ii) a deoxyribonucleoside containing a first nucleobase, wherein said nucleic acid molecule comprises (a) the nucleotide sequence shown in SEQ ID NO: 13, (b) a nucleotide sequence encoding the protein encoded by SEQ ID NO: 13 or (c) a nucleotide sequence hybridizing under stringent conditions to the complementary sequence of (a) or (b), and wherein said deoxyribonucleoside containing a first nucleobase is further reacted with a second nucleobase to form a deoxyribonucleoside containing said second nucleobase.

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Claim ~~88~~. The method of claim 87, wherein the second nucleobase is selected from cytidine and cytidine analogs.

Claim 88 (~~89~~): The method of claim 88, wherein the analog is selected from the group consisting of: 6-methyl purine, 2-amino-6-methylmercaptopurine, 6-dimethylaminopurine, 5-azacytidine, 2,6-dichloropurine, 6-chloroguanine, 6-chloropurine, 6-azathymine, 5-fluorouracil, ethyl-4-amino-5-imidazole carboxylate, imidazole-4-carboxamide and 1,2,4-triazole-3-carboxamide.

Claim 89 (~~90~~): The method of claim 87, wherein the first nucleobase is selected from the group consisting of adenine, guanine, thymine, uracil and hypoxanthine.

Claim 90 (~~91~~): The method of claim 87, wherein the nucleic acid molecule is contained in a recombinant vector in operative linkage with an expression control sequence.

Claim 91 (~~92~~): The method of claim 87, wherein the nucleic acid is contained in a recombinant cell.

Claim 92 (~~93~~): The method of claim 71, further comprising an isolated polypeptide having NdT activity.

Claim 93 (~~94~~): A method for preparing an enzyme for an in vitro method for the enzymatic synthesis of deoxyribonucleosides, comprising reacting (i) an isolated nucleic acid molecule encoding a deoxyribokinase (dRK, EC 2.7.1.5) with (ii) deoxyribose, wherein said deoxyribose is phosphorylated to deoxyribose 5-phosphate, and wherein said nucleic acid molecule comprises (a) the nucleotide sequence shown in SEQ ID NO: 11, (b) a nucleotide sequence encoding the protein encoded by SEQ ID NO: 11 or (c) a nucleotide sequence hybridizing under stringent conditions to the complementary sequence of (a) or (b).

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Claim 94 (~~95~~): An method for synthesizing deoxyribonucleosides <u>in vitro</u>, comprising contacting a mixture containing deoxyribose and phosphate with an enzyme having NdT activity to form deoxyribose 5-phosphate and obtaining deoxyribose 5-phosphate therefrom.